

Map Projections

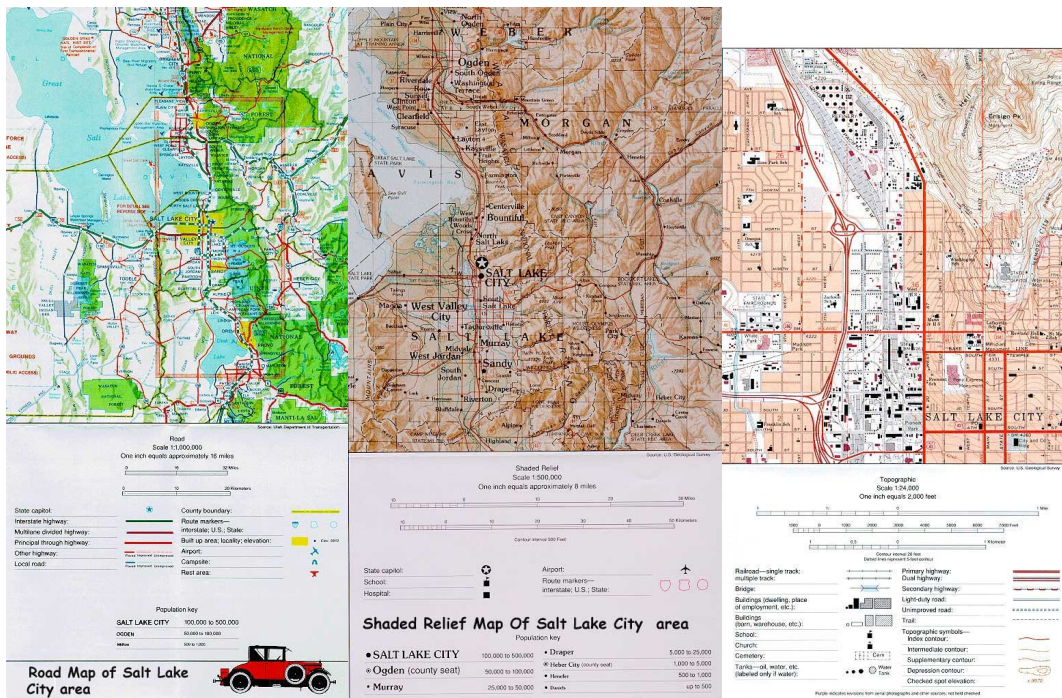
This worksheet is designed to accompany this website:

http://www.classzone.com/books/earth_science/terc/content/investigations/es0301/es0301page01.cfm

Any part of the worksheet that makes reference to clicking something has an animation on the web page.

People make and use maps for a variety of purposes. Consider some of the different maps you have used. Would a world map be useful in showing how to get from your school to your home? Would a city street map be useful in showing the shape of the land?

Click each map to see a larger view. Scroll to the bottom of the larger images to see all the information. Explore the similarities and differences across these maps.



1. List at least three similarities and three differences among the maps.

We live on a round, three-dimensional planet. A major challenge of map making is to depict or project Earth's three-dimensional surface on a flat two-dimensional surface.

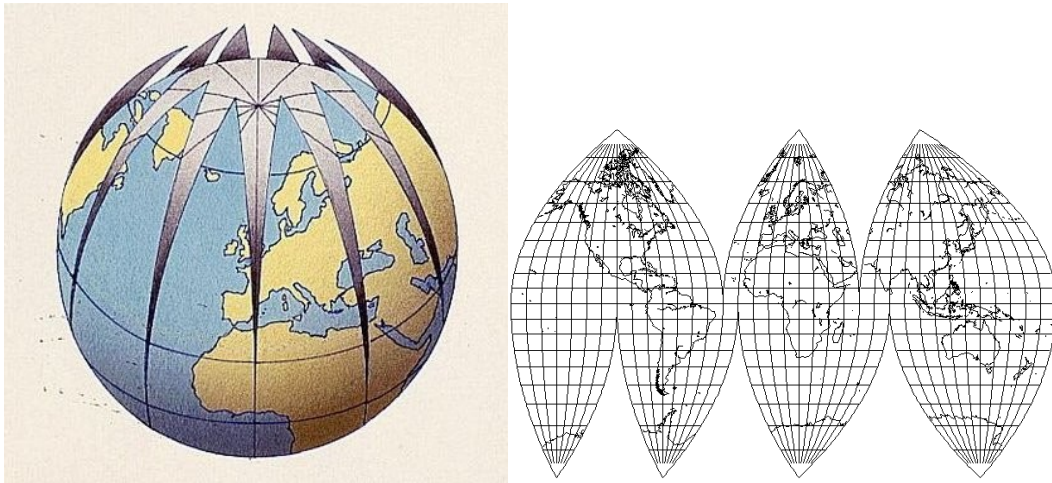
Click the image to see the animation. Click and drag the slider back and forth to visualize Earth's spherical shape.



1Earth's Surface is curved.

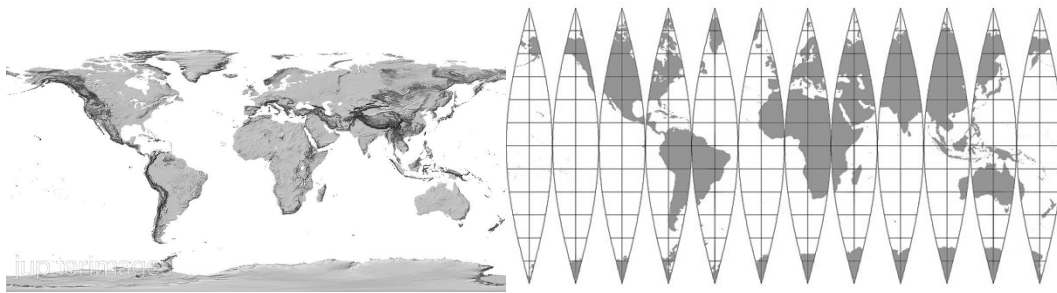
Earth's surface is curved. Watch what happens when this surface is pulled off a globe.

 Click the image to see an animation of this process.



2. What happens to the surface of Earth when it is pulled off a globe and flattened?

Observe the flat map below. Click the button below to compare this map to the peeled-off surface from the previous animation. Flip back and forth between the two maps to compare them.



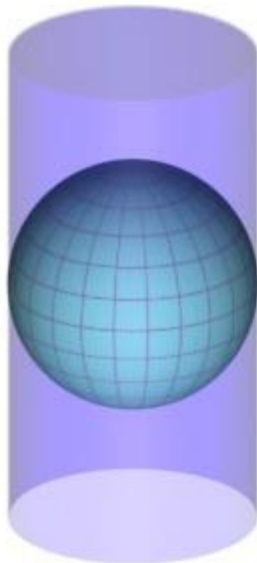
2Globe Map Projection

3Flat Map Projection

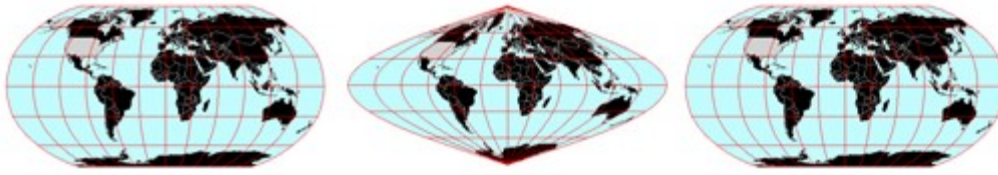
3. How do the two images compare?

In order to generate a flat map, features on the spherical Earth are projected onto a surface. To create this map, the shapes of the continents, along with latitude and longitude lines, were projected onto a cylinder. Then the cylinder was split and flattened. This type of projection is called a Mercator projection.

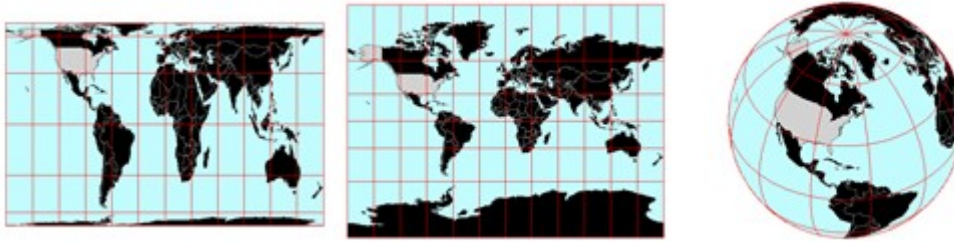
You can visualize the process of "projection" for this map by imagining a light shining at the center of the sphere, and considering the cylinder around it as a screen. Lines and shapes projected onto the screen by the light become the flat map.



Some map projections preserve distance. That is, distances on the map are scaled accurately to the same distance on Earth. Other projections portray area accurately—the shapes of landmasses shown are similar to their actual shapes.



4Robinson
5Sinusoidal
6Mercator



7Orthographic
8Miller
9Peters

4. In which projection does Antarctica appear disproportionately large?

5. In which projection does Asia appear disproportionately large?

6. Which projection minimizes distortion of South America, Africa, and areas near the equator?

8. Which projection minimizes distortion of the United States and other temperate regions?

9. Which projection minimizes distortion of land in polar regions? Look at Antarctica or Greenland.